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On the Direction and Prospect of Low Carbon and Energy Saving in Sewage Treatment

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Abstract:With the continuous development of science and technology in China, all levels of society have begun to pay attention to green environmental protection, and higher demands have been put forward for energy conservation and emission reduction, which promotes the application of energy-saving and low-carbon technology in many fields[1]. Especially in the sewage treatment, the rational application of various energy-saving and low-carbon concepts and technologies is of great significance to improve the level of sewage treatment comprehensively. This paper will theoretically and specifically analyze the direction of application, goals and the prospects for development of sewage treatment and low-carbon energy saving.

Key Words:Sewage treatment; energy saving and low carbon; the direction of application; the prospects for development

1.Introduction

With the further development of the “Eleventh Five-Year Plan”, environmental protection refers to the general term for all human activities in order to solve the actual or potential environmental problems, and to coordinate the relationship between human beings and the environment[2]. It will help solve various problems, and protect and improve the environment by using the theories and methods of environmental science[3].Therefore, in view of the current low carbon, sustainable direction of sewage treatment is summarized. Mainly from the operation of energy saving, green technology and green energy in three aspects, the technical measures were elaborated in the paper[4]. And the domestic and foreign development status was compared and analyzed by combining with the three aspects of technical measures[5]. The suggestions and prospects about the sustainable development of sewage treatment in our country were put forward.

2. Sewage treatment and low carbon energy saving

According to the national “12th Five-Year Plan”, China’s current economic development has been changed from the simple “worship of GDP” into the scientific development concept as the strategy of sustainable development, environmental resources and energy consumption problems have become the bottleneck of development. As an effective measure, sewage treatment plant is to protect water environment and control organic pollution, and the secondary pollution problem is widely concerned. The CO emissions produced by urban sewage treatment plants include two parts: one is the power (electricity) consumption converted into CO emissions; the other part is the carbon source in the sewage is discharged by oxidation. In addition, with the rapid development of China’s industrial level, water pollution is more and more serious to gradually be the threats to people’s living environment, and also restricts the further development of society.

At present, there has at least 3,000 sewage treatment plants in operation in China. The shortage of water and the

aggravation of environmental pollution for water make the rapid development of industry about sewage treatment in China, but the problems, such as high energy consumption and secondary pollution, become prominent. In the process of sewage treatment, CO emissions for power consumption accounted for a large part. The power industry in China is still dominated by thermal power generation, and coal is the main energy source, which accounts for about 80% of the total power generation. It is estimated that the CO generated by the electricity consumption of urban sewage for each 1M treatment is 0.26kg. The annual CO emissions generated by the 10x10'm sewage treatment plant due to the power consumption are equivalent to the annual total emissions of 2600 cars. A 10x10'm sewage treatment plant produces as much CO per year from its power consumption as the annual emissions of 2,600 cars. To sum up, the development direction of low carbon and energy saving in sewage treatment mainly includes the three aspects of energy saving and consumption reduction with green technology and green energy. Because sewage treatment is a worldwide problem, it is of great significance to the social stability and economic development of our country to study the management of energy consumption and measures to save energy and reduce consumption of sewage treatment plants.

3. The basic concept of low carbon and energy saving in sewage treatment

Sewage treatment refers to the process of purifying sewage in order to meet the water quality requirements for discharge into a certain body of water or reuse. It is gradually and widely used in various fields，such as construction, agriculture, transportation, energy, petrochemical, environmental protection, urban landscape, medical treatment, catering and so on, and walks into the daily life of ordinary people increasingly. According to the classification of sewage source, sewage treatment is generally divided into production sewage treatment and domestic sewage treatment. Production sewage includes industrial sewage, agricultural sewage and medical sewage；The domestic sewage is the sewage produced in daily life, which refers to the complex mixture of various forms of inorganic and organic matter, including: Floating, suspended solid particles of large or small size，colloidal and gelatinous diffuser and pure solution. According to the quality of water pollution, there are two types of water pollution: one is natural pollution; the other is man-made pollution, which is the most harmful to water body.

Low carbon means lower emissions of greenhouse gases mainly including carbon dioxide. Energy-saving mainly refers to the reduction of energy consumption as far as possible to produce products with the same quantity and the same quality as the original. With the development of the world's industrial economy, the development of animal husbandry in agriculture, the rapid increase of population, the unlimited rise of human desire and the waste way of production and life, the world climate is facing more and more serious problems，for example，carbon dioxide emissions are rising. The Earth's ozone layer is suffering an unprecedented crisis, and catastrophic global climate change is on the rise, which have seriously endangered the living environment and health safety of human beings. Therefore, low carbon energy saving focuses more on reducing energy consumption as much as possible in the sense of environmental protection.

4. Development prospect and technical direction of treatment for waste water and low carbon energy saving

With the improvement of people's living standard and economic level, the country has been constantly improving the water quality of sewage treatment plants to meet the needs of economic life. The treatment consumption standard of currently waste water reaches 0.15 -0.28 (kW·h) /m3 sewage, and the national average cost of sewage treatment is 0.8 yuan /m3, and the cost price shows a rising trend. Faced with such a high cost of sewage treatment, relevant departments are trying to make good use of new technologies by combining with the characteristics of each region and the advantages of each treatment plant, to explore the energy demand of the unit process, and make effective operation and management planning of the sewage treatment plant. Because of water pollution in the study of ecological energy conservation and environmental protection problems is important, so the plans and designs of the sewage treatment plant foe the first stage reflect energy saving purpose, and then select the suitable technology of sewage treatment, equipment,

and ways of saving energy. Also，the nation department should formulate relevant regulations of energy conservation and emissions reduction, to punish the lack of laws and regulations of individual units warning, effectively implement the work of saving energy and reducing consumption of sewage treatment plants in order to maintain the sustainable development process of national economic development.

Therefore, it is representative to apply low carbon and energy saving technology in the process of sewage treatment. At present, with the development of the national strategy for energy conservation and environmental protection, biotechnology has produced huge social and economic benefits in various fields, which can be divided into several technologies: First, aerobic activated sludge process. That is, the application of activated sludge refers to that these activated sludge contains more aerobic microorganisms, and when it is under the effect of wind regulation, these aerobic microorganisms can purify the sewage; Second, biological method uses biological membrane of purifying water body to control the technology, which is also a common treatment technology of waste water for energy conservation and emissions reduction. Compared with activated sludge process, biological membrane method has a large biological concentration, including lots of advantages of small consumption, but in the water treatment, there are some deficiencies in water quality treatment; Third, the preparation of environmental biological agents includes new microbial agents, biological catalyst and special environmental microbial strains, which are used to improve the environment or by microbial transformation products. Now this is the most potential of technology in the biological treatment technology of polluted water. At last, as for the field of waste water treatment，aerobic biological treatment is a new process for treating municipal sewage developed on the basis of anaerobic sludge bed, and it is mainly used in municipal sewage treatment plants with a daily treatment capacity of less than 200,000 tons. Therefore, all of the above technologies belong to the important development direction of low carbon and energy saving in sewage treatment, and have excellent development prospects eventually.

5.Conclusion

The energy saving and emission reduction of sewage treatment is an inevitable trend of the current social and economic development, as well as a new opportunity and challenge. According to the study, energy conservation and emission reduction of sewage treatment must be based on green environmental protection, and the concrete implementation of its content will bring new vitality to social development and environmental governance, and guide a new direction.

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